



PATENT  
Atty. Dkt. APPM/6303.02/CPI/COPPER/PJS

2812

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:  
Chung, et al.

Serial No.: 09/965,373

Confirmation No.: 6509

Filed: September 26, 2001

For: Integration of Barrier Layer  
and Seed Layer

Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

Group Art Unit: 2812

Examiner: Unknown

**CERTIFICATE OF MAILING**  
37 CFR 1.8

I hereby certify that this correspondence is being deposited on  
May 2, 2002 with the United States Postal Service as First Class  
Mail in an envelope addressed to: Assistant Commissioner for  
Patents, Washington, D.C. 20231.

5/2/02 Kurt M. John  
Date Signature

## SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

The Applicants, and the Attorney who signs below on the basis of the information supplied by the inventor and the information in his file, submit herewith patents, publications, or other information of which they are aware, which may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 CFR § 1.56.

While the information submitted in this Supplemental Information Disclosure Statement may be material pursuant to 37 CFR § 1.56, it is not intended to constitute an admission that any patent, publication, or other information referred to therein is prior art for this invention unless specifically designated as such.

In accordance with 37 CFR § 1.97, this Supplemental Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other possibly material information as defined under 37 CFR § 1.56(a) exists.

The patents and/or publications submitted herewith are set forth on the attached Form PTO-1449.

If the sum of \$180.00 is due under 37 CFR § 1.17(p) pursuant to § 1.97, the Commissioner is hereby authorized to charge this fee, and any other fee necessary to make this submission timely, to the Deposit Account No. 20-0782/APPM/6303.02/BTP.

Respectfully submitted,

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U.S. Department of Commerce, Patent and Trademark Office (PTO Form 1449 modified)		Docket No. APPM/6303.02	Serial No. 09/965,373
<b>SUPPLEMENTAL LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT</b>		Applicant Chung, et al.	Confirmation No.: 6509
(Use several sheets if necessary)		Filing Date September 26, 2001	Group 2812
	Examiner Unknown	PAPERS MAY 06 2002 C100 MAP REF ID: A64244	

**U.S. Patent Documents**

*Examiner Initial	Document Number	Issue Date	Applicant(s) Name	Class	Subclass	Filing Date If Appropriate
A1	4,813,846	03/21/89	Helms	414	744.1	04/29/87
A2	4,917,556	04/17/90	Stark et al.	414	217	05/26/89
A3	4,951,601	08/28/90	Maydan, et al.	118	719	06/23/89
A4	5,000,113	03/19/91	Wang et al.	118	723	12/19/86
A5	5,028,565	07/02/1991	Chang, et al.	437	192	08/25/1989
A6	5,173,474	12/22/1992	Connell, et al.	505	1	03/11/1991
A7	5,186,718	02/16/93	Tepman et al.	29	25.01	04/15/91
A8	5,205,077	04/27/93	Wittstock	51	165 R	08/28/91
A9	5,234,561	08/10/93	Randhawa et al.	204	192.38	08/25/88
A10	5,259,881	11/09/93	Edwards, et al.	118	719	05/17/91
A11	5,286,296	02/15/94	Sato et al.	118	719	01/09/92
A12	5,580,380	12/03/1996	Liu, et al.	117	86	01/30/1995
A13	5,609,689	03/11/97	Kato et al.	118	719	06/03/96
A14	5,667,592	09/16/97	Boitnott et al.	118	719	04/16/96
A15	5,674,786	10/07/97	Turner et al.	437	225	06/05/95
A16	5,695,564	12/09/97	Imahashi	118	719	08/03/95
A17	5,730,801	03/24/98	Tepman et al.	118	719	08/23/94
A18	5,788,447	08/04/98	Yonemitsu et al.	414	217	08/05/96
A19	5,788,799	08/04/98	Steger, et al.	156	345	06/11/96
A20	5,801,634	09/01/98	Young et al.	340	635	09/08/97
A21	5,856,219	01/05/99	Naito et al.	438	241	08/18/97
A22	5,866,213	02/02/99	Foster et al.	427	573	07/19/97
A23	5,866,795	02/02/99	Wang et al.	73	1.36	03/17/97
A24	5,882,165	03/16/99	Maydan et al.	414	217	09/10/97
A25	5,882,413	03/16/99	Beaulieu et al.	118	719	07/11/97
A26	5,928,389	07/27/99	Jevtic	29	25.01	10/21/96

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Examiner Unknown			

## **U.S. Patent Documents**

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	Examiner Unknown	Date MAY 06 2002	Country JAPAN	Class H01L	Subclass 21/205

**Foreign Patent Documents**

*Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation	
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B1		58-098917	06/13/1983	JP	H01L	21/205	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B2		58-100419	06/15/1983	JP	H01L	21/20	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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B9		62-232919	10/13/1987	JP	H01L	21/205	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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B24		64-082671	03/28/1989	JP	H01L	29/78	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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	Examiner <i>UNKNOWN</i>		

**F reign Patent Documents**

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	B25	64-082676	03/28/1989	JP	H01L	29/80	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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**Foreign Patent Documents**

*Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation	
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	B49	02-074587	03/14/1990	JP	C30B	23/08	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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	B65	03-023299	01/31/1991	JP	C30B	29/40	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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**Foreign Patent Documents**

*Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation	
							YES	NO
	B73	04-031396	02/03/1992	JP	C30B	25/14	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	B74	04-100292	04/02/1992	JP	H01S	3/18	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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**Foreign Patent Documents**

*Examiner Initial		Document Number	Date	Country	Class	Subclass	Translation	
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	B97	05-175143	07/13/1993	JP	H01L	21/205	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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## **Foreign Patent Documents**

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**F reign Patent Documents**

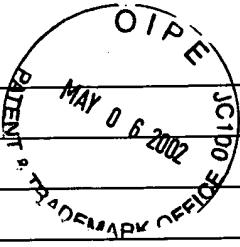
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	Examiner Unknown	<i>O I P E MAY 06 2002 SEARCHED INDEXED SERIALIZED FILED U.S. PATENT AND TRADEMARK OFFICE</i>	
<b>OTHER ART</b>			
*Examiner Initial		Including Author, Title, Date, Pertinent Pages, Etc.	
	C1	Ohba, et al., "Thermal Decomposition of Methylhydrazine and Deposition Properties of CVD TiN Thin Films", Conference Proceedings, Advanced Metallization for ULSI Applications in 1993 (1994), pp. 143-149	
	C2	Schepers, et al., "Low-temperature deposition of titanium nitride films from dialkylhydrazine-based precursors", Materials Science in Semiconductor Processing 2 (1999), pp. 149-157	
	C3	Suzuki, et al., "A 0.2-μm contact filing by 450°C-hydrazine-reduced TiN film with low resistivity", IEDM 92-979, pp. 11.8.1 – 11.8.3	
	C4	Suzuki, et al., "LPCVD-TiN Using Hydrazine and TiCl <sub>4</sub> ", VMIC Conference (June 8-9, 1993), pp. 418-423	
	C5	IBM Tech. Disc. Bull. "Knowledge-Based Dynamic Scheduler in Distributed Computer Control, (June 1990), pp. 80-84	
	C6	IBM Tech. Disc. Bull. "Multiprocessor and Multitasking Architecture for Tool Control of the Advanced via Inspection Tools" (May 1992), pp. 190-191	
	C7	McGeachin, S., "Synthesis and properties of some β-diketimines derived from acetylacetone, and their metal complexes", Canadian J. of Chemistry, Vol. 46 (1968), pp.1903-1912	
	C8	Solanki, et al., "Atomic Layer deposition of Copper Seed Layers", Electrochemical and Solid State Letters, 3(10) (2000), pp. 479-480	
	C9	NERAC.COM Retro Search: Atomic Layer Deposition of Copper, dated October 11, 2001	
	C10	NERAC.COM Retro Search: Atomic Layer Deposition / Epitaxy Aluminum Oxide Plasma, dated October 2, 2001	
	C11	NERAC Search abstract of "Atomic Layer deposition of Ta and Ti for Interconnect Diffusion Barriers", by Rossnagel, et al., J. Vac. Sci. & Tech., 18(4) (July 2000)	
	C12	Abstracts of articles re atomic layer deposition	
	C13	Abstracts of search results re atomic layer deposition, search dated January 24, 2002	
	C14	Abstracts of articles re atomic layer deposition and atomic layer nucleation	
	C15	Abstracts of articles re atomic layer deposition and semiconductors and copper	
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	Examiner Unknown		
<b>OTHER ART</b>			
*Examiner Initial	Including Author, Title, Date, Pertinent Pages, Etc.		
C16	Abstracts of articles – atomic layer deposition		
C17	NERAC Search – Atomic Layer Deposition, search dated October 16, 2001		
C18	Bader, et al., "Integrated Processing Equipment", Solid State Technology, Cowan Pub., Vol. 33, No. 5 (May 1, 1990), pp. 149-154		
C19	Choi, et al., "The effect of annealing on resistivity of low pressure chemical vapor deposited titanium diboride", J. Appl. Phys. 69(11) (June 1, 1991), pp. 7853-7861		
C20	Choi, et al., "Stability of TiB <sub>2</sub> as a Diffusion Barrier on Silicon", J. Electrochem. Soc. 138(10) (October 1991), pp. 3062-3067		
C21	"Cluster Tools for Fabrication of Advanced devices" Jap. J. of Applied Physics, Extended Abstracts, 22 <sup>nd</sup> Conference Solid State Devices and Materials (1990), pp. 849 – 852 XP000178141		
C22	"Applications of Integrated processing", Solid State Technology, US, Cowan Pub., Vol 37, No. 12 (December 1, 1994), pp. 45-47		
C23	Kitigawa, et al., "Hydrogen-mediated low temperature epitaxy of Si in plasma-enhanced chemical vapor deposition", Applied Surface Science (2000), pp. 30-34		
C24	Lee, et al., "Pulsed nucleation for ultra-high aspect ratio tungsten plugfill", Novellus Systems, Inc. (2001), pp. 1-2 (COPY NOT AVAILABLE TO APPLICANT AT THIS TIME)		
Examiner		Date Considered	
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